SUN OL SYS TEMS

Universal Networking Mass Storage

A leader in significant innovation,
Sunol Systems pushes the
current technology to its limits
making the future possible today.

Quality

Reliability

Knowledgeable Support

Sunol Systems

1187 QUARRY LANE PLEASANTON, CA 94566 TELEX 703175 (415) 484-3322

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(415) 484-3322

TELEX 703175

KATHLEEN M. ANDERSON
CORPORATE COMMUNICATIONS

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SUNOL SYSTEMS
CORPORATE BACKGROUND

Sunol Systems develops and manufactures Universal Networking Mass Storage Systems for a broad based market of micro computer users. Universal Mass Storage systems are primarily used by users who find it essential to share files and programs.

In February 1983, Dr. Robert McCullough and Robert Lindgren, both formerly from Silicon Valley, established Sunol Systems in Pleasanton, California, a small town near San Francisco.

Sunol became a pioneering leader in Universal Mass Storage Devices by developing RLL (Run Length Limited) on 5¼-inch Winchester. Sunol's advanced proprietary controller design increases storage capacity by up to 60% and data transfer speed by 50% over conventional recording techniques.

Sunol was first to provide a Random Access Back-up Tape System which can be randomly accessed like a floppy disk; first in networking up to seven different operating systems on the same Sunol SUN★DISK; and first again with the Macintosh interface which implements Apple's own Applebus networking protocol. This provides the "Mac" with versatile networking mass storage capabilities.

In the spring of 1984, a rapid increase in sales and product shipments demanded expansion. A new 23,000 sq.ft. facility was located in the same business park and more employees were added to the Sunol team. All areas were expanded to fill the market demand for each newly developed product.

Sunol's products have gained worldwide acceptance and a strong international network of distributors provides worldwide availability as well as in over 80 U.S. cities.

Sunol's technical personnel have a clear and in-depth understanding of mass storage and network system technology. Their designs incorporate the latest advances in storage and network systems technology. Research and development is an on-going process at Sunol. Quality and reliability are designed into each new product before manufacturing gets the go-ahead to start production. The final product is tested and then tested again. The Sunol team takes pride in shipping the best product available.

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SUNOL SYSTEMS
CORPORATE BACKGROUND
FACT SHEET

PRIMARY BUSINESS

Established February 1983; Sunol Systems develops and manufactures Universal Networking Mass Storage Systems for a broad based market of microcomputer users. Universal Networking Mass Storage Systems are primarily for users who find it essential to share files and programs. Sunol's advance controller design is now available as Semiconductor Components and Board Level Products

KEY PERSONNEL

Dr. Robert MuCullough,
Chairman of the Board

Robert Lindgren,
President

Trevor Hazel,
Director of International Sales

Jesse Velasquez,
Director of Manufacturing

Jack Corrigan,
Director of Finance

Kathleen Anderson,
Corporate Communications

TAKING THE LEAD!

Sunol became a pioneer leader in the Universal Networking Mass Storage field be being the first to develop the following products.

RLL (Run Length Limited)
Development of the RLL encoding technique on the 5-¼ inch Winchester disk that increases storage capacity by up to 60% and data transfer speed by 50%.

SUN★SAFE™
A random access back-up tape system which can be randomly accessed like a floppy disk.

SUN★DISK™
Networking capabilities of up to seven different operating systems at one time and networking mass storage from 8-92 megabytes of user capacity per disk.

SUN★MAC™
The Macintosh interface which implements Sunol's own Applebus™ protocol, and can network up to 31 Macintosh computers on a single SUN★DISK™.

SUN★NET II™
Combines network disk server and printer server in one unit. Utilizes up to one mile of twisted pair cable with a transfer rate of 250K bits per/sec.

SUN★LOGIC™
Sunol's advanced proprietary Universal Mass Storage Controller Chip Set and Board Level Products, utilizing the RLL encoding technique.

KEEPING THE LEAD!

Sunol believes that the future success will not depend on past inventions or accomplishments, but rather on the technical competence and creative skills of our personnal.

SUN★NET™
Enables up to 64 users of various microcomputers to share the same storage.

SUN★SHARE™
A common storage area that allows transfer of files between different types of operating systems, disk formats, and the SUN★SERVER™ and is accessable by all users.

SUN★SERVER™
Printer or communications server that attachs two printers, modems, or one of each to the SUN★NET™. Automatically handles all multiple printing and communication tasks without user intervention.

SUN★LINK™
Adapter kits and software for over twenty different microcomputers.

DISTRIBUTION OF PRODUCTS

Sunol Systems supplies its products through a comprehensive distributor network. This network encompasses over 80 U.S. cities and 30 foreign countries.

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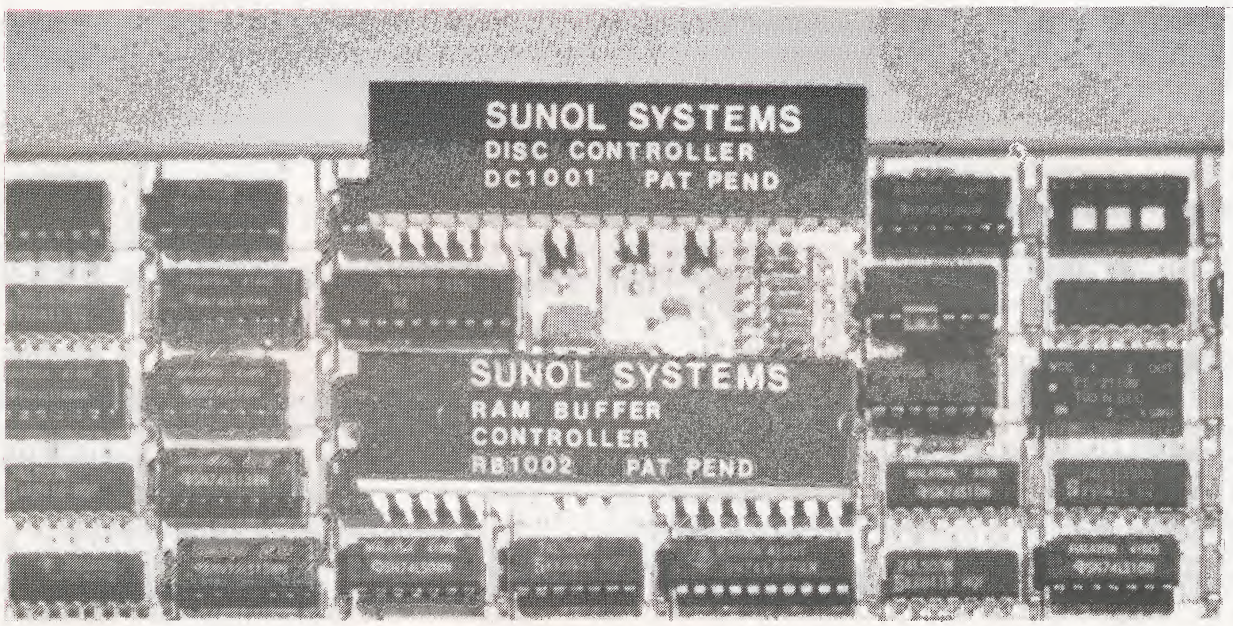
SUNOL SYSTEMS

SUN★LOGIC™

UNIVERSAL MASS STORAGE CONTROLLER
COMPONENTS AND BOARD LEVEL PRODUCTS



The Sunol Advanced Propriety Mass Storage Controller design is technology on the leading edge and provides some of the following benefits:

- Increased storage capacity up to 60% utilizing Sunol's Proprietary Run Length Limited encoding technique for 5¼ inch Winchester disk drives.
- Increase speed performance; transfer rates increase from 5.0 to 7.5 megabites/sec. for Winchester disk drives.
- Sunol Proprietary mass storage controller component available in SASI/SCSI, and IBM PC board level products.
- Sunol proprietary mass storage controller and board level products
  Supports: ST506, ST412, ST412HP, ESDI, Winchester Disks.
  Supports: standard - 5¼" SA 400 Floppy Disks.
  Supports: floppy tape interface;
  Supports: hard sector formats for removable Winchester Disks, Floppy Drives.
  Supports: Tape Streamer interface QIC-36 (avail 2Q85)
- Substantial systems performance increases, with multiple sector read/writes.
- Reliable built in error correction code.
- The two chip set solution that can interface as a standard peripheral chip or as an intelligent remote device.
- Sunol Run Length limit is field proven with over thousands of its' Sun*Disk installed.
- Lower Power CMOS LSI Components.

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SUNOL RUN LENGTH LIMITED

In the search for larger capacity and faster mass storage devices Sunol Systems has developed an advanced proprietary controller which achieves up to 60% more usable storage and 50% faster transfer rate on standard 5¼ inch Winchester, floppy Drives. The capacity and speed improvements are accomplished by Sunol's Run Length Limited Encoding Technique. Sunol's Run Length Limited (R.L.L.) is significantly improved over MFM (modified frequency modulation) or FM (frequency modulation) recording methods. To understand R.L.L. you must first understand FM and MFM.

FREQUENCY MODULATIONS (FM) (Single Density)

FM is a self clocking encoding scheme used to record bit serial data on magnetic media. Bit cell clocking is achieved by writing first a flux reversal (one bit) to define the leading edge of the cell. If the data value of the cell is a one the second flux reversal will occur approximately midway through the bit cell, if a zero there will be no further flux reversal (one bit) until the leading edge of the next bit cell. Therefore FM is organized as clock bit, data bit, clock bit, data bit, and so on.

MODIFIED FREQUENCY MODULATION (MFM) (Double Density)

Unlike FM, MFM does not provide clocking pulses to create a data window, MFM data window is generated from the controller to derive a reference clock from the incoming data bit stream, that is used to define bit cell boundries. However MFM does use a clock bit between two consecutive zeros.

RUN LENGTH LIMITED (RLL)

In Sunol's RLL code there is nothing that can be identified as a "clock bit" or a "data bit". Rather there are simply data patterns and corresponding code patterns. Sunol uses an "RLL 2,7" code which encodes the data so that there is a minimum run of 2 zeros between flux transactions and a maximum run of 7 zeros between flux transactions. Hence the name Run Length Limited.

SUNOL'S RLL USES THE FOLLOWING CODE

CHART A

BINARY DATA	RLL CODE	CONSECUTIVE ZEROS
11	1000	MINIMUM 2 ZEROS
10	0100	MAXIMUM 7 ZEROS
000	100100	
001	001000	(Note that the last two
010	000100	digits are always zero
0110	0100100	and the first digits
0111	0001000	never exceed 4 zeros)

For example a hexidecimal 67 will look like the following:

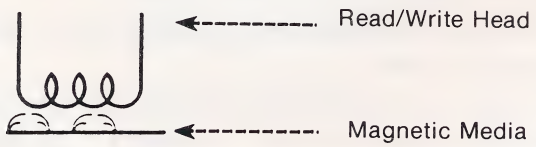
HEX		BINARY
67	=	0110 0111

RLL CODE = 00100100 00001000

FLUX TRANSITION

Flux transition is one of the major factors which affects the magnetic recording density. The maximum record density = flux transition/physical distance. To help understand the magnetic recording and why flux transition are so important is explained below in simple terms.

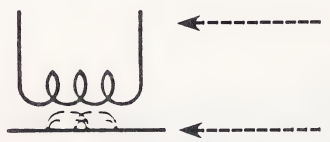
A read/write recording head is placed



above a magnetic surface. The R/W heads can record and detect megnetic fields or magnetic flux. However magnetic field can not be too far apart because the R/W heads can not detect the magnetic fields or flux.

Too Far Apart

On the other hand the magnetic fields cannot be too close together, otherwise they will cancel themself out.



Too Close Together

The secret is to achieve a window which is not too far apart from the flux transition and not too close together. Therefore Sunol has developed it's RLL 2,7 code. The 2,7 code represent the minimum and maximum number of zeros between characters which achieve the most optimum flux transitions.

For example: Recording 7B in Hexidecimal is converted to binary as:

HEX = 7B BINARY = 0111 1011

Reference Chart A

RLL 2,7 Code = 00010000 01001000

Data ---- 0 0 0 1 0 0 0 0 0 1 0 0 1 0 0 0

Flux transitions 

COMPARISON BETWEEN FM, MFM, RLL

CHART B
CLOCK SPEED

FM	5 Megahertz
MFM	10 Megahertz
RLL	15 Megahertz

CHART C
DATA TRANSFER RATE

2.5 Megabit/sec
5.0 Megabit/sec
7.5 Megabit/sec

CHART D
WINDOW SAMPLING TIME

FM	200 Nanosecond
MFM	100 Nanosecond
RLL	66.67 Nanosecond

DISC DRIVE MANUFACTURER	CYLINDER	HEAD	SECTOR/ TRACK	USABLE CAPACITY	SUNOL'S INCREASED CAPACITY	READ FORMAT
SEAGATE, TANDON, CMI, NEC, IMI	306	2	17	5326848		MFM
			26	8146944	2820096	RLL
SEAGATE, TANDON, CMI, NEC, IMI	306	4	17	10653696		MFM
			26	16293888	5640192	RLL
SEAGATE,TANDON, CMI, NEC, IMI	306	6	17	15980544		MFM
			26	24440832	8460288	RLL
OTARI	306	8	17	21307392		MFM
			26	32587776	11280384	RLL
MINISCRIBE	480	4	17	16711680		MFM
			26	25559040	8847360	RLL
TULIN	640	6	17	33423360		MFM
			26	51118080	17694720	RLL
CDC	697	5	17	30333440		MFM
			26	46392320	16058880	RLL
VERTEX	987	7	17	60135936		MFM
			26	91972608	31836672	RLL
MAXTOR	918	15	17	119854080		MFM
			26	183306240	63452160	RLL

(NOT ALL 5¼" WINCHESTER DISK SUPPORT RLL)

UNIVERSAL MASS STORAGE CONTROLLER COMPONENTS AND BOARD LEVEL PRODUCTS

DISK CONTROLLER DC1001

30 MHZ CLOCK

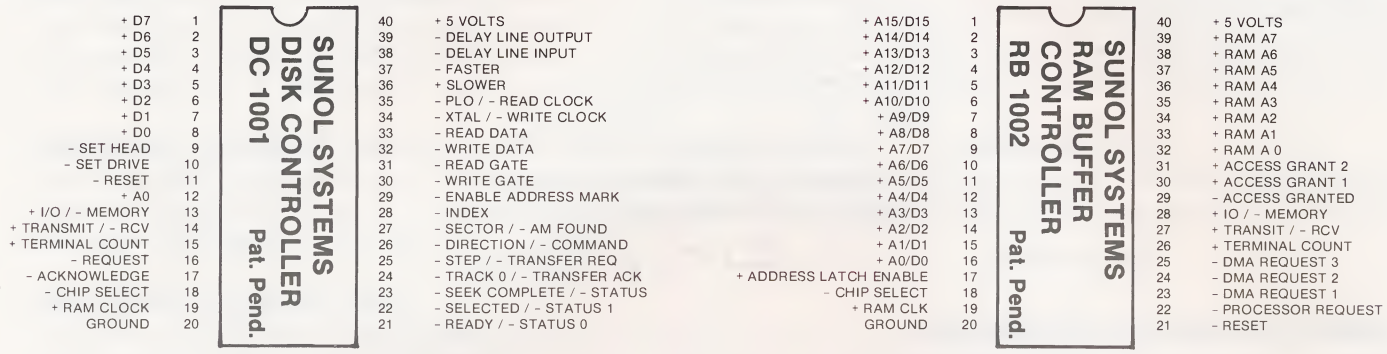
CONTAINS:

1. SERIALIZER-DESERIALIZER
2. MFM AND RLL ENCODING AND DECODING
3. GENERATE LOAD STROBE FOR DRIVE SELECT AND HEAD SELECT REGISTERS
4. INTERNAL PHASE DETECTOR FOR PHASE LOCK OSCILLATOR
5. ST-506, ST-412, ST-412HP, ESDI, FLOPPY SA 400, QIC-36 (AVAIL 2Q85)

RAM BUFFER CONTROL RB1002

CONTAINS:

1. DISK RAM ADDRESS COUNTER
2. REFRESH ADDRESS COUNTER
3. REFRESH RATE COUNTER
3. 3 DMA ADDRESS COUNTERS
4. ADDRESS MULTIPLEXING
5. RAM ACCESS PRIORITY NETWORK
6. DMA BYTE COUNTER



BOARD LEVEL PRODUCTS

BLP-SASI

SASI/SCSI WINCHESTER/FLOPPY/FLOPPY TAPE/QIC-36 CONTROLLER BOARDS. MICROPROCESSOR BASED. INCORPORATES SUNOL ADVANCED DISK CONTROLLER (DC 1001) AND RAM BUFFER (RB 1002) COMPONENTS.

BLP-IBM

IBM P.C. CONTROLLER BOARDS WHICH SUPPORTS WINCHESTER/FLOPPY/FLOPPY TAPE/QIC-36 DEVICES.

Model Number	Storage Device	Number of Devices Supported	Interface
BLP-SASI1	Winchester (Removable Winchester)	4	ST506, ST412, ST412HP, ESDI
	and		
	Floppy (Hard Sector Floppy)	4	SA400
BLP-SASI2	Winchester (Removable Winchester)	4	ST506, ST412, ST412HP, ESDI
	and		
	Floppy (Hard Sector Floppy)	1	SA400
	and		
	Floppy Tape	1	SA400
	or		
	Tape Streamer (Avail. 2Q85)	1	QIC-36
BLP-IBM1	Winchester	4	ST506, ST412, ST412HP ESDI
	and		
	Floppy	4	SA400, (IBM PC Compatible)
BLP-IBM2	Winchester	4	ST506, ST412, ST412HP ESDI
	and		
	Floppy (Hard Sector Floppy)	1	SA400
	and		
	Floppy Tape	1	SA400
	or		
	Tape Streamer (Avail. 2Q85)	1	QIC-36

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SUNOL SYSTEMS

Press Release

Contact:
Kathleen Anderson
(415)484-3322

For Immediate Release
SS/15

DATELINE: FALL COMDEX SHOW, LAS VEGAS, NEVADA

SUNOL SYSTEMS ANNOUNCES SUN*LOGIC:

Mr. Robert Lindgren, president of Sunol Systems, has introduced Sunol's Advanced Proprietary Mass Storage Controller design, SUN*LOGIC. Sunol has been a leader in the field of mass storage since the company's inception, and is the first and only company which has designed and put into production the advanced Run Length Limited (RLL) code for 5 1/4 inch Winchester disk drives. RLL provides Sunol with the advantage of offering up to 60% more usable storage and a 50% faster transfer rate than the competition. This design currently has been developed with 188 different T.T.L. and L.S. components, which are standard electronic componentbuilding blocks. Sunol has developed a custom CMOS chip set that will replace most of these T.T.L.devices. This leading edge technology provides the following features:

* Increased storage capacity up to 60% utilizing Sunol's Proprietary Run Length Limited encoding technique.

* Increased speed preformance; transfer rates increased from 5.0 to 7.5 megabits/sec.

* Available in SASI/SCSI and IBM PC board level products.

* Supports ST506, ST412, ST412HP, ESDI, Winchester disks.
  Supports standard 5 1/4" SA 400 floppy disks.
  Supports floppy tape interface SA 400
  Supports tape streamer QIC-36 (available - 2Q85)
  Supports hard sector formats for removable Winchester disks.

* Overall total systems performance increases, with our mutliple sector reads/writes.

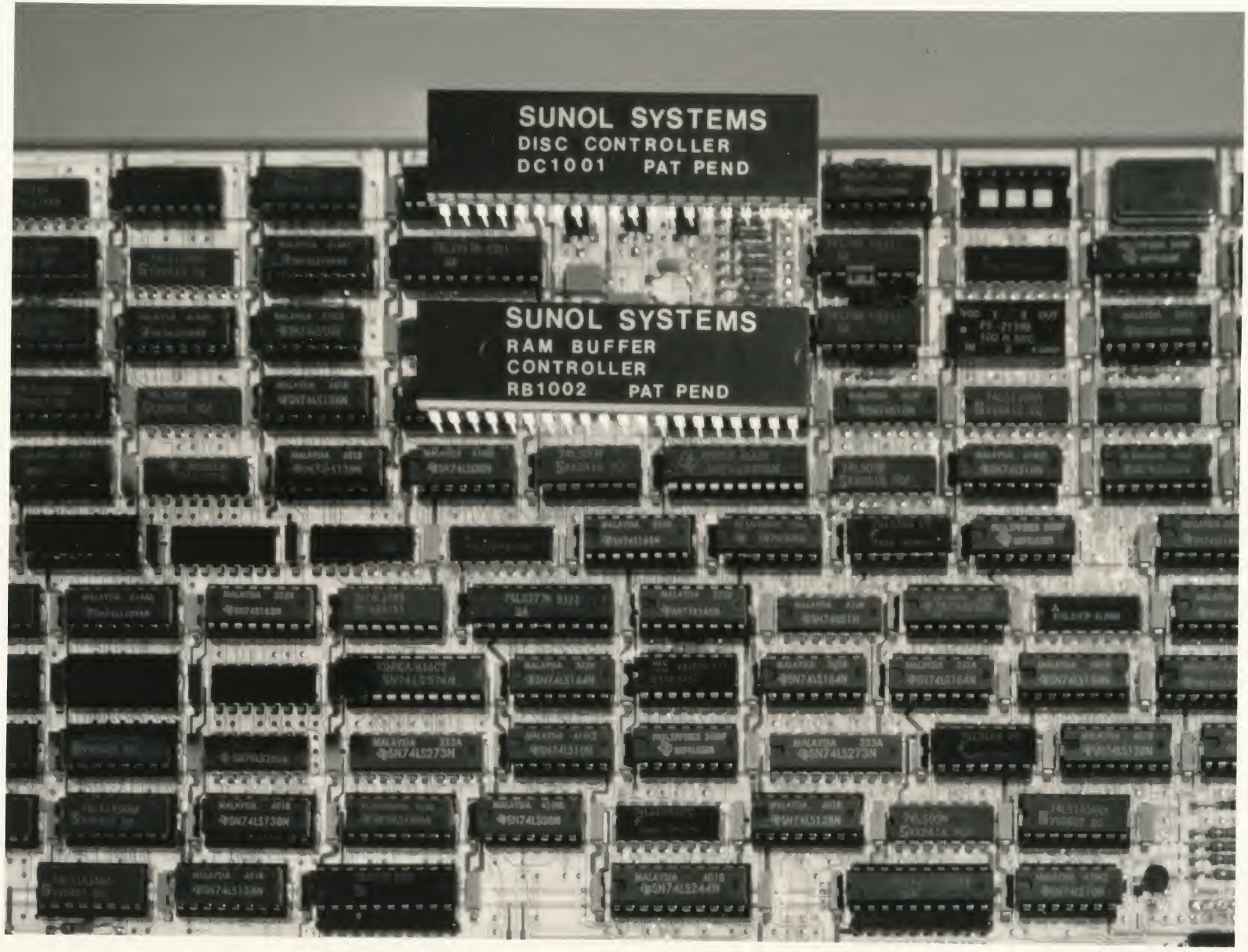
* Reliabilty: built- in with error correction code.

* Field proven RLL design with thousands of SUN*DISK subsystems installed.

* THE TWO CHIP SET SOLUTION THAT CAN INTERFACE AS A STANDARD PERPHERIAL CHIP OR AS AN INTELLIGENT REMOTE DEVICE!

AND THIS IS JUST THE BEGINNING...

Sunol Systems is a privately held corporation located at 1187 Quarry Lane, Pleasanton, California, 94566.


SUNOL SYSTEMS
DISC CONTROLLER
DC1001 PAT PEND
SUNOL SYSTEMS
RAM BUFFER
CONTROLLER
RB1002 PAT PEND

SUNOL SYSTEMS

Press Release

Contact:
Santa Cruz Operations
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Sunol Systems
Kathleen Anderson
(415)484-3322

For Immediate Release
SS/15

DATELINE: COMDEX FALL, LAS VEGAS, NEVADA

SUNOL SYSTEMS, PLEASANTON, CALIFORNIA:
SANTA CRUZ OPERATIONS, SANTA CRUZ, CALIFORNIA:

Sunol Systems and Santa Cruz Operations have announced that the SCO Xenix Apple Lisa Software program now fully supports the Sunol Systems Universal Networking Mass Storage disk drive, the SUN*DISK.

SCO provides a new generation of Xenix software that realizes the capabilities of todays personal computers and their users. Together, with the 8-92 megabytes of useable storage ability, with or without the optional ramdom acess tape back-up cartridge available from Sunol Systems, the SUN*DISK becomes fully capable of running the Xniex program along with other SCO popular software programs for the Apple Lisa

You can see these programs demonstrated in the main convention hall at Comdex in booths 337-339 and/or booths 424/525.

Sunol Systems is based at 1187 Quarry Lane, Pleasanton, Ca., 94566. Sanat Cruz Operations is located at 500 Chestnut, P.O. Box 1900, Santa Cruz, Ca., 95061

SUNOL SYSTEMS

UNIVERSAL MASS STORAGE

for MICROCOMPUTERS

8 • 16 • 25 • 40 • 65 • 92 MEGABYTES

COMPATIBLE WITH OVER 20 DIFFERENT MICRO COMPUTERS INCLUDING

Apricot
Apple II
Epson QX-10
IBM P.C.
KAYPRO
Apple Lisa
Macintosh
Texas Instrument
Victor/Sirius
Leading Edge
Zenith 100/150
IBM P.C. Compatibles
Televideo 1608
Future
Socketed Z80 Micro Computer
Eagle

- **SUN★DISK**
  Using Run Length Limited Coding.
  8, 16, 25, 40, 65, and 92 Megabytes/Drive of usable storage capacity (up to 4 drives per controller for a total of 368 Megabytes.
- **SUN★NET**
  Networks up to 64 various microcomputers and 7 different operating systems all on the same SUNOL disk.
- **SUN★SAFE**
  Random Access Back-up Tape System with removable 23 megabyte tape cartridge. The tape back-up is accessed like a disk, providing the user both file back-up and total disk back-up.
- **SUN★SHARE**
  Provides a common storage area to be accessed by all users. Allows transfer of files between different types of operating systems, disk formats, and to the SUN★SERVER.
- **SUN★SERVER**
  Printer/communication server consisting of two serial RS 232 ports. Accommodates two printers or two modems or a combination. Automatically handles multiple printing and communication tasks without user intervention.
- **HIGH RELIABILITY**
  Utilizes Error Correcting Code to automatically correct read errors.
- **COMPREHENSIVE DISPLAY**
  Dynamic display of the disk drive provides the user with the exact Status, Track, Head, Sector, and much more.
- **HIGH PERFORMANCE**
  50% faster transfer rate, 7.5 vs. 5.0 million/second. Large 16,384 Byte data buffer on the Sunol controller.

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8 • 16 • 25 • 40 • 65 • 92 MEGABYTES

UNIVERSAL MASS STORAGE

For Micro Computers

SUN★DISK
Add Mass Storage to your MICRO COMPUTER SYSTEM.

Sunol Systems offers the latest and most advanced Mass Storage Technology with up to 60% more usable storage. Formated usable storage capacities per disk are 8, 16, 25, 40, 65, and 92 megabytes. Up to four disk drives can be linked together for a total available mass storage of 368 megabytes. (Larger capacity disk drives will be available soon). Sunol's large on-line Mass Storage SUN★DISK will eliminate time consuming floppy disk swapping and provide a more reliable and secure system.

SUN★SAFE
Random Access Back-up Tape System.

The attractive cabinet Sunol provides allows for the addition of an optional removable tape cartridge back-up device. This removable tape cartridge is a standard ¼ inch tape with up to 23 megabytes of storage. Tape cartridges are inexpensive and provide for rapid back-up of information. Unlike streaming tape drives, Sunol's SUN★SAFE Random Access Back-up Tape System is accessed like a floppy disk providing the user with the ability to back-up and restore a single file or the entire disk. Standard operating system commands are used to read and write to the tape.

SUN★NET
Networking available to expand with your needs.

Sunol Systems provides the ability for any user to connect into our advanced local area network, SUN★NET™. SUN★NET™ enables up to 64 users of various micro-computers like Apple II, III, DEC, Epson QX-10, Kaypro, NEC P.C.-8000, Northstar, Osborne, S-100, Texas Instruments, TRS-80 Model I, II, III, Victor, Xerox, Zenith Z89/90/100, I.B.M. P.C., I.B.M. P.C. Compatibles, and other microcomputers to share the same storage. The Sunol Universal Mass Storage Disk Drive will support up to 7 different operating systems such as CP/M 80, MSDOS, UCSD-PASCAL, and CP/M 86, simultaneously. SUN★NET™ is compatible with Corvus, Omninet, P.C. Net, Ethernet. Also SUN★NET™ can work simultaneously together with the other local area networks on the same Sunol disk drive.

FILE LOCKING
Data Security and Protection.

Sunol's universal networking disk supports file locking and unlocking which prevents two or more different users from updating the same file at the same time.

SUN★SHARE
Universal Shareable Data.

SUN★SHARE provides a common storage area which may be accessed by all users regardless of operating systems or disk format. This common storage area is used for transfering files and programs to different users with different operating systems or to the SUN★SERVER for printing or communication. For example, a user that has a data base in a TEXAS INSTRUMENTS computer and wants to transfer it to the APPLE can easily accomplish the task without having to face the laborious job of re-typing the entire data base. SUN★SHARE also provides the users the additional benefit of being able to utilize a peripheral device which is connected to a specific microcomputer. Through SUN★SHARE that device now becomes available to all users on SUN★NET.

SUN★SERVER
Intelligent Communication/Printer Server.

SUN★SERVER is a printer/communication server consisting of two serial RS 232 output ports. This device connects to SUN★NET and will accommodate two printers or two modems or a combination of both. In addition this intelligent server automatically handles multiple printing and comeunication tasks without user intervention. The SUN★SERVER utilizes the SUN★SHARE common storage area to receive, store, and forward data and files from any user. SUN★SERVER is available to any user on the network and provides the users the ability to use common printers and or modems.

RELIABILITY
Automatic Error Correcting.

Reliability has been designed into every product and starts with our advanced recording method called Run Length Limited coding (RLL). Run Length Limited has been used for years and has proven to be far superior to the M.F.M. method. Sunol Systems is the only company which offers Run Length Limited on 5¼ Winchesters. Also included in every Mass Storage unit is automatic Error Correction Code (ECC). The Error Correction Code guarantees high performance and reliable data transfer, and also automatically detects and corrects errors without the users intervention. The display console provides instant and complete status of the Mass Storage Unit indicating current drive selected, head, sector, track and status code plus more. The stand alone diagnostics quickly isolates any problem. And best of all, Sunol Systems Disks require no preventative maintenance.

HOST ADAPTERS
There are over 20 host adapters available for the Mass Storage Unit.

SPECIFICATIONS

MODEL NUMBER	SSD8	SSD16	SSD25	SSD40	SSD65	SSD92
STORAGE CAPACITY PER DRIVE						
USABLE CAPACITY (MEGABYTES)	8	16	25	42	65	92
DATA TRANSFER(MILLON/SECOND)	7.5	7.5	7.5	7.5	7.5	7.5
ACCESS TIME (MILLISECONDS)						
TRACK TO TRACK	3MS	3MS	3MS	5MS	5MS	5MS
AVERAGE ACCESS TIME	70MS	70MS	70MS	30MS	30MS	30MS
HEAD SETTLING TIME	15MS	15MS	15MS	NA	NA	NA
RELIABILITY	11,000 Power on Hours					
PHYSICAL DIMENSIONS	11 in. Wide × 8.5 in. High × 20 in. Deep					
WEIGHT	Approx. Shipping Weight 25 lbs.					
ENVIRONMENTAL LIMITS (OPERATIONAL)						
AMBIENT TEMPERATURE	50° to 115° F					
RELATIVE HUMIDITY	8% to 80%					
POWER REQUIREMENTS						
VOLTAGE	110 or 220 VOLTS (SELECTABLE)					
FREQUENCY	50/60 Hz SINGLE PHASE AC					
TYPICAL CONSUMPTION	78 WATTS					

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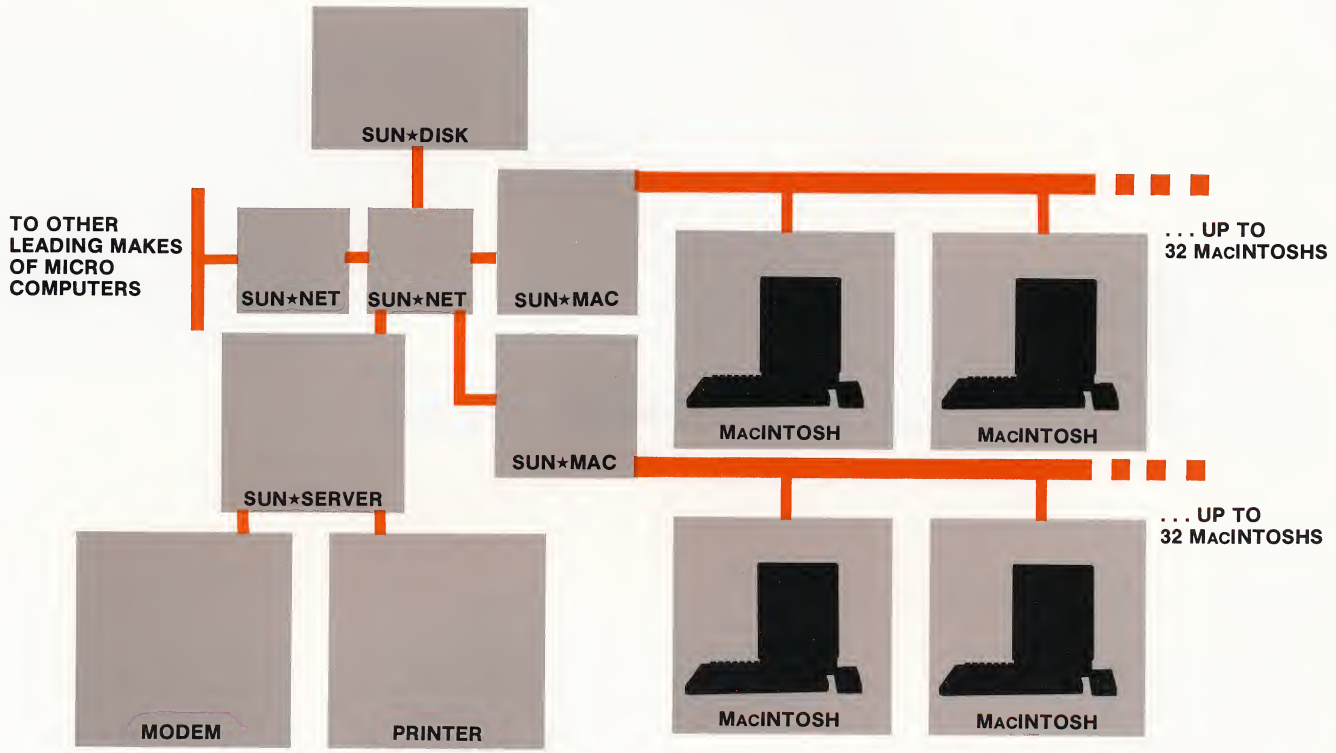
SUN OL SYSTEMS

SUN★MAC

UNIVERSAL NETWORKING MASS STORAGE
for MICROCOMPUTERS
8 • 16 • 25 • 40 • 65 • 92 MEGABYTES



- **INCREASE PRODUCTIVITY**
  By sharing the same files and programs with Macintosh and other various microcomputers.
- **SUN★MAC**
  Networks up to 32 Macintoshs by utilizing the Applebus. This provides an inexpensive solution to networking your Macintoshs. The cost to add additional Macintoshs to SUN★MAC is simply the cost of the cable and connector since every Macintosh comes equipped with an Applebus port.
- **SUN★DISK**
  Usable storage capacities per disk, 8, 16, 25, 40, 65 and 92 megabytes of fast and reliable data storage.
- **SUN★SAFE**
  Random Access Back-up Tape System with removeable 21.5 megabyte tape cartridge. The tape back-up is accessed like a disk, providing the user both file by file and total disk back-up. The Macintosh back-up and restore is accomplished simply by using the logical volumes.
- **SUN★SHARE**
  Provides a common storage area to be accessed by all users. Allows transfers of files between different types of operating systems, disk formats and to the SUN★SERVER.
- **SUN★SERVER**
  Printer/communication server consisting of two serial RS232 ports. Accommodates two printers or two modems or a combination. Automatically handles multiple printing and communication tasks without user intervention.
- **HIGH PERFORMANCE SUN★MAC**
  Fast with data transfer rate of 230,000 bits per second.
- **COMPATIBILITY**
  SUN★MAC is compatible with SUN★NET. SUN★NET offers the users the advantage to network various microcomputers together.

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SUN★MAC

UNIVERSAL NETWORKING MASS STORAGE
for MICROCOMPUTERS
8 • 16 • 25 • 40 • 65 • 92 MEGABYTES

SUN★MAC
Networking and Universal Mass Storage for the Macintosh.

SUN★MAC is an interface between the Applebus*, using Apple's own networking protocol and the Sunol SUN★DISK. A single SUN★MAC allows up to 32 devices, Macintosh workstations, printers, etc. on the network to share a single Sunol SUN★DISK. SUN★MAC will also connect to SUN★NET allowing the Macintosh to communicate with other leading micro computers such as Apricot, Apple II, IBM PC, Televideo and many others.

SUN★MAC uses the communication protocol of RS422 twisted pair cable. Multiple SUN★MAC's can be configured by using SUN★NET thus increasing the network far beyond the 32 user limit of a single SUN★MAC. SUN★MAC is extremely fast with data transfer rates of 230,000 bits/seconds and handles queuing of drive requests from up to 8 Applebus users simultaneously. For every device in the network, all information that is exchanged between devices takes place over twisted pair cable. The cable can be up to 1000 feet in length.

SUN★DISK
Add Mass Storage to your MICRO COMPUTER SYSTEM.

Sunol Systems offers the latest and most advanced Mass Storage Technology with up to 60% more usable storage. Formated usable storage capacities per disk are 8, 16, 25, 40, 65, and 92 megabytes. Up to four disk drives can be linked together for a total available mass storage of 368 megabytes. (Larger capacity disk drives will be available soon). Sunol's large on-line Mass Storage SUN★DISk will eliminate time consuming floppy disk swapping and provide a more reliable and secure system.

SUN★SAFE
Random Access Back-up Tape System.

The attractive cabinet Sunol provides allows for the addition of an optional removable tape cartridge back-up device. This removable tape cartridge is a standard ¼ inch tape with up to 21.5 megabytes of storage. Tape cartridges are inexpensive and provide for rapid back-up of information. Unlike streaming tape drives, Sunol's SUN★SAFE Random Access Back-up Tape System is accessed like a floppy disk providing the user with the ability to back-up and restore a single file or the entire disk. Standard operating system commands are used to read and write to the tape.

SUN★NET
Networking available to expand with your needs.

Sunol Systems provides the ability for any user to connect into our advanced local area network, SUN★NET™. SUN★NET™ enables up to 64 users of various micro-computers like Apple II, III, Televideo, Epson QX-10, Kaypro, Apricot, Texas Instrument, Victor, Zenith 100, I.B.M. P.C., I.B.M. P.C. Compatibles, and other microcomputers to share the same storage. The Sunol Universal Mass Storage Disk Drive will support up to 7 different operating systems such as CP/M 80, MSDOS, UCSD-PASCAL and CP/M 86. Simultaneously. SUN★NET™ is compatible with Corvus, Omninet, P.C. Net and Ethernet, all on the same Sunol disk drive.

FILE LOCKING
Data Security and Protection.

Sunol's universal networking disk supports file locking and unlocking which prevents two or more different users from updating the same file at the same time.

SUN★SHARE
Universal Shareable Data.

SUN★SHARE provides a common storage area which may be accessed by all users regardless of operating systems or disk format. This common storage area is used for transfering files and programs to different users with different operating systems or to the SUN★SERVER for printing or communication. For example, a user that has a data base in an IBM computer and wants to transfer it to the Macintosh can easily accomplish the task without having to face the laborious job of re-typing the entire data base. SUN★SHARE also provides the users the additional benefit of being able to utilize a peripheral device which is connected to a specific microcomputer. Through SUN★SHARE that device now becomes available to all users on SUN★NET.

SUN★SERVER
Intelligent Communication/Printer Server.

SUN★SERVER is a printer/communication server consisting of two serial RS 232 output ports. This device connects to SUN★NET and will accommodate two printers or two modems or a combination of both. In addition this intelligent server automatically handles multiple printing and communication tasks without user intervention. The SUN★SERVER utilizes the SUN★SHARE common storage area to receive, store and forward data and files from any user. SUN★SERVER is available to any user on the network and provides the users the ability to use common printers and or modems.

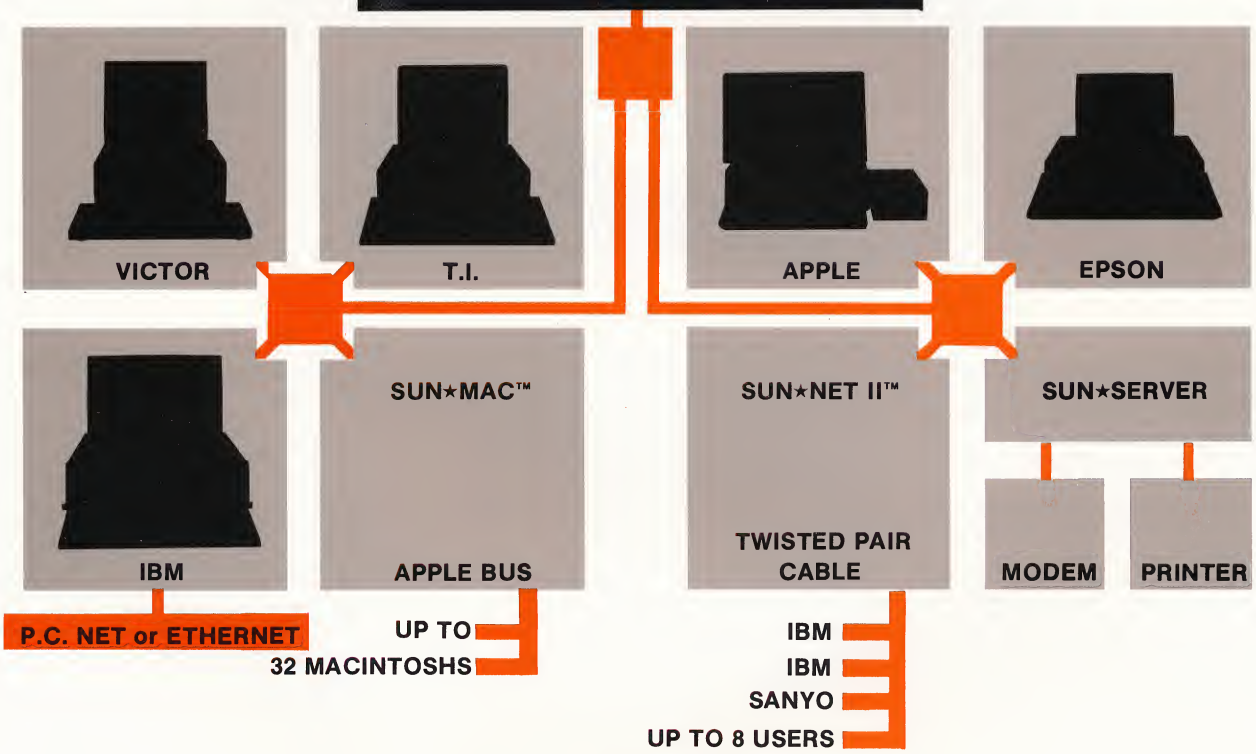
INSTALLING SUN★MAC
SUN★MAC is simple to install by following the user friendly installation programs. These ask the user to choose the number of Macintosh logical volumes, volume size, number of directory entries, then generates a bootable system diskette.

P.O. BOX 1777 1187 QUARRY LANE PLEASANTON, CA 94566 TELEX 703175 (415) 484-3322

SUN OL SYSTEMS

SUN★NET™

UNIVERSAL NETWORKING MASS STORAGE
for MICROCOMPUTERS



- **SUN★NET™** is compatible with over 20 different micro computers including

Apricot	**Macintosh**	**Televideo 1608**
Apple II, III	**Texas Instrument**	**Future**
DEC Rainbow	**Osborne**	**Zenith Z89/90/100/150**
Epson QX-10	**Victor/Sirius**	**Socketed Z80 Micro Computer**
IBM P.C.	**Leading Edge**	**Eagle**
KAYPRO	**Zenith 100/150**	
Apple Lisa	**IBM P.C. Compatibles**	

- Increase productivity by sharing the same files and programs for various microcomputers.
- Networks up to 64 various microcomputers and 7 different operating systems.
- **SUN★SHARE™** provides a common storage area to be accessed by all users. Allows transfer of files between different types of operating systems, disk formats and to the SUN★SERVER™.
- **SUN★SERVER™** is a printer/communication server consisting of two serial RS-232 ports. Accommodates two printers or two modems or a combination. Automatically handles multiple printing and communication tasks without user intervention.
- Compatible with other local area networks like PC Net or Ethernet, etc.
- **SUN★NET™** has no cumbersome executive operating program.
- **SUN★DISK™** performs the networking function which makes the network totally transparent to the user.

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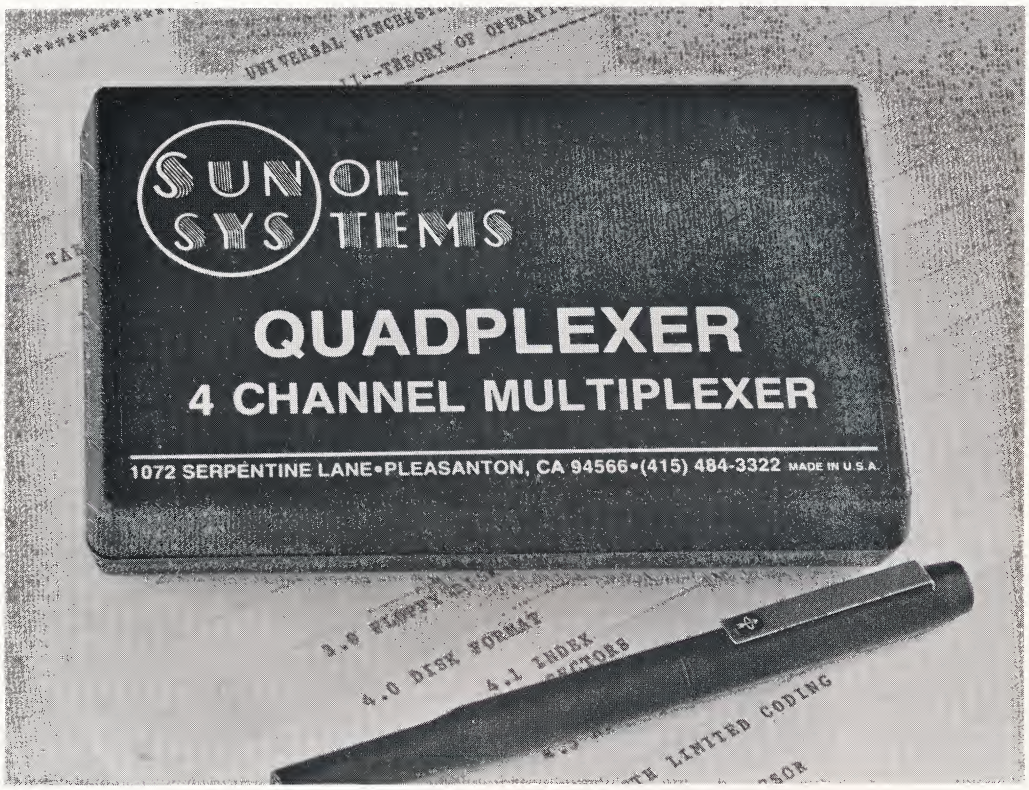
SUN★NET™

UNIVERSAL NETWORKING MASS STORAGE for MICRO COMPUTERS



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HOST ADAPTERS

There are over 20 host adapters available for the Mass Storage Unit.

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